TONING: DEFINITION AND USAGE IN MUSIC THERAPY

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ABSTRACT

This study was undertaken in an attempt to define toning more clearly and establish a theoretical basis for future research. The acoustic, physiologic, and psychologic parameters of spontaneous and sustained self-generated vocal sound were investigated.

Findings indicate that there is a measurable vibration which radiates from the vocal apparatus which impacts the person who tones internally, through resonance and bone-conducted hearing, and externally, by way of the external auditory canal. Although pre-music, sustained vocal sound may affect the limbic system as does music. There is enough evidence to warrant further investigation in the area of toning and pain reduction. Furthermore, toning is seen as an adjunctive tool in music therapy.

Every disease is a musical problem;

every cure is a musical solution.

--Novalis'

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CHAPTER 1: INTRODUCTION

A phenomenon has emerged, in recent times, whereby a number of musicians, both therapist and non, are working with vocal tones and laying claim to their healing effects (Keyes, 1973; Beaulieu, 1987; McClellan, 1988; Campbell, 1989). The process is often described without substantive explanations, or scientific explanations are coupled with mystical thought. What is the fundamental rationale for such claims? Is there an underlying body of scientific knowledge upon which sound/tonal research can be established? What place does this phenomenon have in music therapy?

The purpose of this work is to explore toning from acoustic, physiologic, and psychologic perspectives with the intention of 1) describing the nature of toning, and 2) establishing a theoretical foundation for future research. A review of the literature will be undertaken, and personal experience with the technique will be examined. The process and uses of toning will be described, as well as its limitations; recomendations for

further research will be given.

What is Toning?

Bruscia (1989) has defined toning from the work of Laurel Keyes, who did not actually define the technique; rather, she described the process. Bruscia states that it "is the use of vocal sounds to restore vibratory patterns of the body within a perfect electro-magnetic field, thereby enabling the body and all of its parts to function in harmony" (p. 25). Campbell (1989) defines toning in two ways. He says that it is "the conscious elongation of a sound by using the breath and voice" (p. 62). Campbell also says that toning is the "vocal sounding of the breath, no matter what the pitch or quality" (p. 69).

This writer would offer an alternative definition. toning is the use of personal vocal sound to change a particular state of being. The vocal sounds are made by the individual making the change. There are instances of toning for another, but this writer believes the most effective and lasting changes are those made by the self. The focus of toning is to attend to the state of the body. Any change in body state will, most likely, effect a change in mental state (Achterberg, 1985; Kenny, 1982).

Insight into undesireable behavioral patterns may also come out of this process.

The process of toning involves producing musical and non-musical sounds with the intention of freeing the "body-voice" (Keyes, 1973, p. 12) to work with vocal resonance. Keyes discusses the body-voice at length. She wrote that, usually, the voice "is dominated by intellectual direction and it is allowed to express only as the mind dictates" (p. 11). She advocates freeing the voice from mental constraints in the same way that a groan, a sigh, or laughter emerges "unhindered by the mind" (p. 12).

Freeing the body-voice, then, is allowing the self free vocal expression without initial mental direction other than to allow the sounds to emerge. This state of vocal freedom has been found by this writer to be a prerequisite to working with vocal resonance, because it relieves tension which, in turn, increases vocal resonance.

When the voice is free to explore vocal tones, the individual can begin to experience resonances within and around the body. Vocal resonance and its possible physiologic effects are fuel for future research, and specific topics will be identified.

Toning also brings increased understanding of self through body awareness and may lead to a creative venue of self expression. Sokolov (cited in Bruscia, 1987) says that "important messages from the body are how the individual gains access to the various parts of him/herself, what sounds and music are contained within the body parts, and how the various parts relate to one another" (p. 357). She goes on to say that "producing a tone requires the self to integrate all of its life forces, while resonating with the tone penetrates blockages and liberates the life forces" (p. 357).

History of Toning

From an historical perspective, toning is both recent and ancient. As will be seen in Chapter Two, humankind has always used the voice for self-expression and healing. As a recent phenomenon, Laurel Keyes (1973) reports that she began working with self-generated vocal sound in the late 1950's. The only testing in which Keyes reports her involvement took place at the Menninger Clinic. The results showed that an alpha brain-wave state was easily induced in Keyes while toning. Subsequently, theta waves were also produced. Keyes relates many anecdotal stories

of people who reported positive results using toning, but no data base was established.

Tomatis (in Campbell, 1989) hints at the importance of sustained self-produced vocal sound when he describes the resultant malaise seen in a French monastery when chanting was eliminated from the daily routine. A return to the practice of daily chanting, along with some temporary mechanical intervention, brought recovery. This is an interesting anecdote but not the stuff of which scientific inquiry is made and only related to one aspect of toning, i.e. the tones are sustained.

Keyes (1973) records a statement from the All-Union Research Institute of U.S.S.R. which relates the resonance aspect of toning: "Sonic oscillation, when applied to the human body, will effect a micromassage of tissues and cells which effect a balance and improve blood circulation, metabolism, and the pulsing of the nervous system and endocrin glands" (p. 99).

No direct research literature on toning has been found, to date, but this writer is aware of one study yet to be published. Ryder et al (personal communication, 1989) state that toning showed significant increases in secretory IgA levels indicating that toning may have an impact on psychoneuroimmunology.

In order to understand what toning is, what possible effects it may have on an individual, and what its place in music therapy might be, the following areas were investigated and will be presented:

The voice, as an instrument of tonal expression, the vocal development of the infant, and some cultural aspects of tonal expression will be presented in order to show the inherent, human need to use the vocal apparatus in a variety of ways. The mechanics of vocal production will be briefly stated as they relate to vocal resonance.

Acoustical information will be scattered throughout this work as it relates to the vibratory nature of life and as it provides a standard of measurement. Vowel sounds are used to direct a tone toward a particular body location. Vowel formants and their related frequencies provide an understanding of how this occurs and will be discussed.

The anatomy and physiology of the ear and the pathway of audition will be outlined briefly. The question here is how audition impacts the process of toning since the person who tones experiences the sound from within, through bone conduction and resonance, and from without by way of the external ear canal.

From a psycho-physiological perspective, the

phenomena of relaxation, excitement, and catharsis will be explored. Some attention will also be given to altered states of consciousness and their possible connection to toning.

The known uses of toning will be given, and the process will be described for each. Generally, the technique alters according to the intended use. This writer has found that toning has energizing, calming, cathartic, and pain reducing features. Much of this information is based on eight years of personal experience with the technique. Clinical examples will be given when possible. Correlation with the work of others will follow.

The role of toning in psychotherapy will be addressed. It appears to be most closely related to Gestalt and Reichian methods as they relate to body awareness and methods of changing unacceptable elements of the body-state.

Throughout this work, toning will be compared to other vocal techniques of singing and chanting. There are similarities, of course, and areas of overlap. toning often leads to either singing or chanting, and may incorporate either within the process.

CHAPTER 2: THE NATURE OF VOCAL EXPRESSION

The First Vocal Sounds

Human beings enter this world equipped with a powerful apparatus for communication and expression, the voice. During the course of normal development, the infant experiences the voice, plays with it, and learns to use it. Keyes (1973) said that "infants have a language of Toning. Their little cries and murmurings express bodily feelings" (p. 12). Children in their first year of life utter sounds which are common to all languages, but as they begin to relate to the environment, children retain only those sounds which are a part of their culture (Gardner, 1981).

Generally, the first vocal sound is the cry. Fridman (1973) believes that "the first cry is a generator not only of the spoken language and of musicality, but also of movement and musical rhythm" (p. 264). She reports that "the cry of the newborn comprises approximately 5-12 contiguous sounds" which oscillate and repeat (p. 264).

The cry begins at full lung capacity; the initial sound is louder and higher than those that follow. The pitch is uncontrolled and ranges between 300-500 hertz. The loudness levels are 60-85 dB. Initially the cry is reflexive, but the infant soon learns to use it as a means of communication.

Humming and cooing are other early infant sounds which are associated with more pleasurable feelings. (Ostwald, 1973). The hum is heard particularly during feeding, and cooing, once the child is satiated. In this oral phase, the child explores different sounds and sound making. The first sounds are made in the back of the throat; as the child gains control over the tongue, the sounds move forward (Ostwald, 1973). There is a primary circular reaction whereby the infant produces a sound, perceives or experiences it, and then replicates it. The soundmaking is a source of pleasure, of gratification. This is rudimentary toning wherein the infant uses all of the available voice as an expression of self.

Vocal skills broaden in the latter half of the first year, the addition of teeth allow for new sounds, and babbling becomes more melodic. Gardner (1981) states that "initial observations confirm that children's babbling includes melodic and intonational as well as phonological

experimentation. Indeed, it may be inappropriate to isolate early language from early musical chanting, the two appear indissolubly linked" (p. 74). In the healthy child, vocal expression is tonal expression.

Concerning the second half of the first year, Preu (cited by Michel, 1973) states that

> in practice the child...cannot vocalize intervals greater than a fifth. Falling intervals predominate as far as the major third...children can hardly manage a rising third, whereas, falling, it seems to be common. The only explanation...must be that at this age the majority of children's utterances are in a falling motion, and here it's easier to sing a major third than a minor third. (p. 16)

It is interesting to note that the oldest known scale was apparently a descending one (Murchie, 1967). This natural falling motion is used in toning.

As the child develops, the vocal range increases, and the child begins to sing song fragments. "They appear to lack organization, having little of our adult sense of tonality" (Gardner, 1981, p. 74). As the language of the culture becomes more available to the child, tonal development is linked to the music of the culture. Keyes (1973) believes that "as soon as the baby learns to

combine mental images with the voice, the natural sounding is curtailed and interference is imposed upon the body-voice. This begins to close the door between the conscious and subconscious mind, between thinking and feeling communication" (p. 12).

This work is not intended to follow the full vocal development of the child. The intention is rather to show the universality of vocal expression: making vocal sounds is a natural, innate tendency which is frequently pleasant, and these sounds are tonal in nature. Herein lie the roots of toning.

Cultural Aspects of Tonal Expression

Ethnomusicologist John Blacking (1973) has concerned himself with determining "what music is" so that "we might be able to use and develop it in all kinds of ways that have not yet been imagined, but which may be inherent in it" (p. 26). He says that "music is humanly organized sound" (p.10), and looks at the relationship between sound as object and man as subject. Blacking believes "that we ought to look for the relationships between patterns of human organization and the patterns of sound produced as a result of organized interaction" (p. 32).

Should we not also look at the sounds that are being organized and consider the possible intrinsic value of these sounds? Sound making, particularly vocal tone production, is a natural, personal function. Early cultures, which were so interpersonally dependent, used this natural tendency for the enrichment of the whole, or tribe. The indigenous people of the American continent are one example of how primitive peoples use vocal sound.

Densmore (1926) found that "the radical difference between the musical custom of the [American] Indians and our own race is that, originally, the Indians used song as a means of accomplishing definite results" (p. 62). Song was used in treating the sick, for example. It was seen as essential to putting forth the "orenda" or spirit which man "shared with all living things" (p. 63).

Boughton (1972) determined that "a large proportion of the religious songs are in part, and sometimes wholly, composed of unintelligible words or meaningless vocables" (p. 7). Baker (1976) agrees and says that simple, natural sounds, such as "he ya! he!" or meaningless words are repeated often (p. 67). Compare this with the present day phenomenon of glossalia seen in some spiritual practices. Is there an inherent need for vocal expression separate from the conscious communication of ideas? This may

indicate that the feeling nature also requires vocal expression.

Baker (1976) also reports that "more highly developed songs" coexist with the more "primitive source songs" (p. 68). He believes that this shows that the earlier songs "are most intimately connected with [the Indian's] sensibilities" (p. 68). In the primitive cultures studied by Baker then, the voice was used to express both feelings and ideas.

Clynes (1982) has discovered that there are cross-cultural "biologic patterns of expressing specific emotions and qualities" (p. 49). These "essentic forms" appear to correspond to the musical elements of "timbre, as well as the durations, rise and decay, and loudness envelopes of the musical elements" (p. 49). Clynes believes that the quality of the sound is provided by thought.

In contrast, Altshuler (cited by Alvin, 1966) believes that timbre, in addition to pitch and intensity, provides a " 'thalamic response' to sensations which need not be interpreted by the higher functions of the brain. They do not carry a symbolic or intellectual meaning. Nevertheless each of them is a vital factor in the emotional power of music" (p. 62). Fonagy (cited in

Sundberg, 1982) looked at emotional phonation by measuring "glottal behavior" and found "emotion-dependent glottal profiles" which he interpreted as "pre-conscious expressive gestures" (p. 145).

In considering our modern times, Lowen (1975) said, "We cannot escape the conclusion that the forces inhibiting self-expression, and, therefore decreasing our energetic functioning derive from this culture and are part of it" (p. 50). Moses (1954) says that the vocal range shrank with civilization "to the point where speech melody is now merely a weazened emotional scale on which rational articulation plays its piece" (p. 41).

Toning produces sounds which, because of their pre-musical nature, carry no musical thought or idea. It is a method of expressing the feeling nature and may be a way to break through cultural inhibitions.

Lomax (as reported by Merriam, 1964) has found interesting differences in vocal techniques while attempting to describe stylistic differences between cultures. He says, "the manner of Indian singing is strikingly muscular in character...Indians characteristically sing at full volume. Their singing tones are throaty, husky, sometimes grating, rich in nasal overtones, and produced at the normal speaking pitch" (p.

106). As a contrast, the Eurasian technique is "ordinarily high-pitched, often harsh and strident, delivered from a tight throat with great vocal tension" (p. 106).

Attention to differences in vocal timbre, awareness of differing cultural social norms, and a connection to the field of laryngology brought Lomax to suggest correlations between vocal technique and other behaviors. Lomax (in Merriam, 1964) found "a correlation between vocal tension and vowel usage and movement:

> (1) High frequency of front vowel and front vowel movement are regularly associated with vocal tension and with sources of psychic tension and social tension.
>
> (2) Conversely, high frequency of back vowels, especially low back vowels, and movements to and in the back, are regularly associated with vocal relaxation and with sources of psychic relaxation and the social patterns that produce them. (p. 107)

It is important for the therapist who chooses to work with the voice to consider these types of cultural differences. This will be addressed further in Chapter Five.

Historical Trends of the Use of the Voice in Healing

Radin (cited in Lundin, 1967) said that "much evidence of the use of music in healing comes from our studies of the American Indians. The Wallawalla Indians, for example, believe that song influences the cure of a patient; thus convalescents are ordered to sing for several hours a day" (p. 306).

Certain physicians have recognized the role of singing in health. In the 1700's, "singing was prescribed for hypertensive patients by Dr. Biehle after he observed that professional singers were normative" (Slesnick, 1983, p. 5). "Drs. Binet and Courtier measured the effects of isolated notes, chords, and songs on respiration. The notes and chords yielded an increase of 3.0 respirations per minute" (Slesnick, p. 6). The story of how chanting, or the lack of it, affected the Beneditine Monks in a certain French monastery has already been told in Chapter One. "Singing has also been used for treatment of speech disorders and for exercize of the jaws, larynx, lungs, and diaphram. With proper instruction it is an excellent exercise for muscles of the chest and abdomen" (Lundin, 1967, p. 317).

Which quality of singing may lead to health? Although far from conclusive, these reports of the use of

singing suggest that there is something in the act of vocal sound making, separate from the ideas conveyed in song, which might restore or sustain health.

In 1956, Moses demonstrated that he could, by listening to a tape recording of a voice, obtain information consistent with that obtained in a Rorschach test. Ostwald (1963), through acoustical analysis, delineated four voice types. This will be explored further in Chapter Three.

These vignettes, although too few to allow any definite conclusions, intimate that vocal expression has several possible roles in health maintainance: increased vigor, stress reduction by way of lowering blood pressure and increasing lung capacity, and as a diagnostic tool.

CHAPTER 3: THE VOCAL INSTRUMENT

The Mechanics of Vocal Production

"The propagation of a musical sound requires an exciter, a vibrator and a resonator. The vibrator has to be set in motion or 'excited' by some source of energy" (Greene, 1972, p.7). The human instrument is a wind instrument (Khambata, 1977) wherein air from the lungs excites the larynx. The emitted sound is amplified by the resonating cavities of the nose and mouth.

Respiration

On inhalation, air enters the body via the nose or mouth, travels through the pharynx, larynx, trachea, bronchi, and enters the lungs. Normal exhalation reverses the flow, and there is a soundless emission of air. These same organs are used in sound production. The same stream of exhaled air is "capable of activating vocal fold stimulation" (Boone, 1983, p. 15). The lungs and surrounding musculature provide the energy and support

for the vocal sound.

Phonation

The larynx, or voice box, sits atop the trachea, is composed mainly of cartilage and muscle, and is lined with mucous membrane (Anthony & Kolthoff, 1975). The mucose forms a pair of folds which cover the vocal cords. The central space between the folds is known as the glottis. The intrinsic laryngeal muscles are concerned with movement of the vocal cords; the extrinsic muscles serve as anchors, elevators, and depressors (Greene, 1972).

Sears (1977) has determined that "initial laryngeal adjustments occurred well before the onset of phonation, suggesting that the mechanical properties of the sound generator were pre-set according to some preprogrammed pattern of command signals from the brain" (p. 81). Although beyond the scope of this paper to answer, this raises a question about the difference between intentional and spontaneous vocal sounds. What triggers the brain signals and are they the same for those sounds which do not arise from direct intention, such as those in some toning techniques?

According to the pre-determined adjustment of the

larynx, the intrinsic muscles adduct the vocal folds. The air pressure from below (sub-glottal pressure) forces the vocal folds apart. The vocal fold tension and the Bernouille force, or glottal suction, return the folds to origin. It is this valve-like, rapid and repeating, interruption of air through the glottis which produces vocal sound (Sears, 1977).

Generally, the length, mass, and tension of the vocal folds determines the frequency of the vibration, or pitch. Khambata (1977) notes that changes in the vocal cords themselves are seen:

> In the very lowest notes, the whole length of the vocal cords vibrate and the free edges are thickened and rounded. With a rise in the pitch there is progressive thinning or sharpening of the opposing vibrating edges, and in the so called head register, only the membranous parts of the cords vibrate. (p. 67)

The extrinsic muscles lift the larynx slightly during high note singing and lower it for singing low notes (Boone, 1983).

The oral and pharyngeal cavities are altered according to the particular speech sounds to be emitted, either vowel or consonant. Vowel sounds are considered

to be tones in that they show "complex, recurrent waves" on an oscilloscope; consonants are noises since they show random patterns, no pitch (Greene, 1972, p. 10). According to Risset and Wessel (1982):

> A vowel corresponds approximately to a spectrum with a given formant structure. A formant is a peak in the spectral envelope that occurs at a certain frequency...and the formants can be related to resonances in the vocal tract. (p. 27)

Vocal Resonance

According to Khambata (1977), "the pure laryngeal sound in itself is thin and weak" (p. 65). As the sound passes through the pharynx and mouth, it becomes enhanced by these natural resonators.

A resonator is "a selective body designed to respond to one particular frequency which is known as its resonant frequency" (Greene, 1972, p. 12). The term is "more commonly used with reference to objects" that "are capable of reinforcing a certain range of tones" (p. 12). The "effective frequency range of a resonator" is referred to as its "band width" (Ladefoged, 1960, p. 65). The resonator acts as a filter by reinforcing only those

frequencies which fall within the band width. The greater the range of frequencies, the richer the quality or resonance.

Minifie (1973) states that those cavities above the glottis, that is, the throat, nose, and mouth are the most efficient resonators, and that the chest cavity produces a "barely audible tone" (p. 243). However, Khambata (1977) says that "parts of the thoracic wall and particularly the sternum act as sounding boards" (p. 65).

The pharynx is the back resonator which alters in depth with movement of the root of the tongue and with a rise and fall in pitch. Vowel formants cause a change in size and shape of the back resonator. Greene (1972) suggests that these changes are more important to vowel quality than those of the front resonator, the oral cavity.

Vocal Dimensions

Perkins (cited in Boone, 1983) has delineated six measurable dimensions of the voice: pitch, loudness, quality, register, constriction, and vertical focus. Several authors (Greene, 1972; Ladefoged, 1960; Madsen, 1965) consider pitch, loudness, and quality to be

subjective terms in that they refer to the listener's experience of sound. The alternate, acoustical terms of frequency, intensity, and wave form will also be used herein, as they reflect the mechanical, or vibrational, aspects of vocal sound production. Frequency is a physical term and refers to the "rates of fluctuation of air pressure" (Ladefoged, 1960, p. 21) caused by the sound wave. We perceive this rate as having a particualr pitch. Intensity, or the level of loudness which we hear, is determined by the amplitude of the sound wave. The terms timbre and quality may be used interchangeably and they refer to the characteristic sound of the wave which, as will be explained later, is determined by the emphasized overtones. It should also be noted at this time that the word tone, as it can refer to either the pitch or the quality of the sound (Randel, 1978), will be used throughout this work to denote the perceived sound of the vocal emission.

Pitch

As stated earlier, the valve action of the opening and closing vocal folds creates the emerging sound. It is generally considered that the length, mass, and tension of

the vocal cords/folds determine the vibratory frequency of the sound. According to Ladefoged (1960), a decrease in length and mass, and an increase in tension will all increase frequency. This is contradicted, in part, by Boone (1983) who says a short fold vibrates slower than a long one. Khambata (1977) says that the vocal cords vibrate segmentally. Greene (1972) adds that the "different sections of the vibrator may vibrate at different frequencies" adding additional sounds called overtones (p. 11).

It is generally agreed that increase in subglottal pressure will increase pitch. Sears (1977) has determined that the Bernouille force, the sucking action of the glottis, occurs mainly "in the chest register when the folds are relatively thick and present a longer restricted passsage to the air flow" (p. 79).

Loudness

Boone (1983) tells us that loudness, or intensity, is "directly related to changes in subglottal and transglottal air pressure" (p. 36). Khambata (1977) says that amplitude decreases as the pitch rises (p. 67). Sears (1977) points out that we know how much effort it

takes to produce a certain level of intensity, based on past experience; it is voluntary muscular movement, a subjective experience.

Quality

It is the body cavities or resonators which modify the laryngeal sound. The resonators filter and selectively amplify the fundamental note and its overtones (Sears, 1977). "Thus a complexity of waves varying in amplitude and frequency can be produced. It is this complexity of sound waves which gives musical sound its quality or resonance" (Greene, 1972, p. 11). Minifie (1973) describes:

> During the production of vowels the vocal tract may be viewed as a tortuously shaped tube open at one end (the opening between the lips) and bounded at the other end by a vibrating valve which has the effect of closing off the tube at the larynx. The three-dimensional geometry of this tube may be altered through the contraction of muscles which regulate the movements of the tongue, velum, pharynx, mandible, lips, epiglottis, and larynx. These structures may be moved individually or in various

combinations. The combination of structures which move during the production of a particular speech sound will determine the unique vocal tract configuration, and hence the unique acoustical filter for that sound. (p. 243)

Register

Register, as generally defined, refers to "the different portions of the [vocal] range, which are distinguished, according to their place of production and sound quality, as 'head register,' 'chest register,' etc." (Randel, 1978, p. 417). Ostwald (1963) says that "register refers to a physical event which results from an energetic change within the muscular coordination of the vocal cords" (p. 47). As pitch rises and falls, changes in the vocal folds are noted. Concurrently, different resonators are called into play. Thus, as Khambata (1977) has said, "In the chest register the singer experiences a maximum sense of vibration in the thoracic cavity, while in the uppermost notes in the head register this appears to be experienced mainly in the head" (p. 67). In Boone (1983), "Van den Berg (1964) describes three primary forms of voice register: chest, mid-voice, and falsetto" (p.

35). Ostwald (1963) uses the terms chest, mixed, and head, and calls the switching points, "nodes" (p. 47).

Boone (1983) compares Van den Berg with Hollien who, after studying X-rays of the larynx, determined there are two registers which he called normal and falsetto. Boone also notes that "some singers seem to have only one register; no matter how they change their pitch, their voices always seem to have the same quality, with no discernable break toward the upper part of their pitch range" (p. 35).

Constriction and Vertical Focus

"Differences in the tension in the elastic and muscular walls of the throat and mouth cavity change the flexibility of the human resonators and influence vocal tone" (Greene, 1972, p. 17).

Vertical focus relates to the placement of the tone. At the lower end of the vertical focus the sound is felt to emerge from the throat, whereas at the higher end the sound is focused in the head (Boone, 1983). The vertical shift of focus is along a continuum.

Diagnostic Evidence Presented in the Voice

"Emotions are of course closely related to the sound of the voice" (Sundberg, 1982, p. 137). Several related parameters appear to be involved in providing information about the emotional state of a speaker: muscular tension of the resonator cavities (Greene, 1972), movements of the vocal apparatus, and sub-glottal pressure (Sundberg, 1982). These translate into the acoustically measurable phonation frequency pattern, phonation frequency movement, and amplitude.

Sedlacek and Sychra (cited in Sundberg) "showed that emotional states can be identified regardless of ability to understand language and despite cultural differences" (p. 138). Kotlyar and Marosov (also cited in Sundberg) showed that "each mood investigated showed a typical pattern of acoustic characteristics" (p. 144)

Ostwald (1963) has been able to identify four acoustic voice stereotypes through reference to case material and half-octave band measurements. He describes each voice type as having a characteristic acoustic pattern.

The sharp voice is penetrating and carries a non-verbal "help me" message. These patients are annoying, with self-seeking and aggressive behaviors . Ostwald

includes hysterics and schizophrenics in this category.

The flat voice is characteristic of those who are listless, resigned, and depressed. It is a "flabby" or "sickly" sound. It announces the patient's "dependency need and helplessness" (p. 67).

The hollow voice presents the "lifeless, shattered and empty sound often emitted by cachetic, debilitated or stuperous patients" (p. 74). Acoustically there is only one formant (or signal peak) and there is little or no resonance; there is also a drop-off in energy. The hollow voice is seen in "psychosomatic patients during moments of inhibition when consciously or unconsciously the voice is used to convey a feeling of weakness" (p. 74).

The robust voice pattern is seen in "booming, impressive, successful-sounding voices. The sound may be emitted by persons who are, and those who pretend to be, extrovert, aggressive, and confident" (p. 79). There are "high levels of acoustic energy plus a rather symmetrical appearance of the curves, at times around a point where a relatively large amount of energy is concentrated" (p. 80).

Ostwald (1963) believes that acoustics can make a tangible contribution to emotional soundmaking. "If the patient cannot put his problems into words but makes

nonverbal sounds about them [as in toning], the process of acoustic measurement may assist the translation of this nonverbal behavior into verbal communication" (p. 85).

Lowen (1975) has also made observations about vocal behavior. He states that "the abscence of vibration denotes a stress or holding, whether in the body or in the voice. In the latter it produces a loss of resonance" (p. 271). He believes that the quality of the voice will be distorted when there is tension that interfers with respiration.

Lowen (1975) has also observed that a consistently high pitched voice shows "suppression of deep notes that express sadness" (p. 273). Conversely, he believes that a chronically low pitched voice shows a "denial of the feelings of fear and an inhibition against its expression in a scream" (p. 273). A healthy voice demonstrates a combination of head and chest tones.

CHAPTER 4: TONAL VIBRATION

What is the stuff of which tone is made? How can it affect the human organism? What is our true substance? This chapter will briefly consider the vibrational aspects of vocal sound and matter. Surely this is a formidable topic, however, the intent here is to simply provide a basis for understanding why vocal sound has a physical effect on people.

The Vibratory Nature of the Human Organism

All that of which the human body is composed--bone, blood, nerve, muscle--is comprised of cells. Cells contain protoplasm which consists of twenty-four chemical elements combined in various compounds. The atoms of the elements carbon, oxygen, hydrogen, and nitrogen constitute more than 99% of the atoms in protoplasm (Anthony & Koltfoff, 1975). Atoms, according to fundamental chemistry, are the smallest part of an element which still retain the characteristics of that element.

In atoms, electrons vibrate around protons (Murchie, 1967). Murchie points out the relationship between sound

and matter. He says "sound is wave motion" (p. 366), and that the study of wave motion is important for understanding sound as well as the "very fundamentals of matter itself".

> A wave is a shape in motion...built of energy--energy that can pass from wave to wave as individual waves are born and die while their group goes on, the energy living and flowing independently of any single form--a fundamental something that is ever more demonstrably the building block of the world. (Murchie, p. 400)

Hedden (1980) reminds us that this "acoustical energy is radiated outward from a source into three-dimensional space; that is, the acoustical energy proceeds outward as a spherical wave front" (p. 39). Vocal tones, then, are vibrations which radiate spherically and travel through a system which is already vibrating.

Cymatics

Fascinating research into this connection between sound and matter was first reported by the eighteenth-century German physicist Ernst Chladni (McClellan, 1988). He showed that a single, sustained tone caused sand

particles to move into a geometric pattern. Variations of pitch resulted in changing patterns--all of some organic form, e.g. concentric circles, spirals, hexagons.

Hans Jenny, a Swiss scientist from this century, took remarkable photographs of the effects of tones, pure and complex, on various materials, both liquid and solid. In his work, "he discovered that the evolving forms repeated themselves in predictable ways and resembled the growth patterns of organic living organisms: chromosomes, cells, molecules, bone tissue, growth rings in trees, as well as crystals" (McClellan, 1988, p. 50).

His work in Cymatics led Jenny to speculate that "each cell, as a result of vibration, generated its own frequency while several cells of the same frequency would combine to generate a new frequency that would be harmonic to the first" (McClellan, 1988, p. 51). In turn, an organ composed of these cells would have its own frequency that was harmonic to the origin cell, and then, of course, the body would produce a composite harmonic frequency. Jenny felt that an "understanding of how frequency acts upon genes, cells and other structures of the body" would be "the key to healing the body with specific tones" (McClellan, 1988, p. 51).

According to Cymatic therapy, a practice not accepted

in this country, disease is the result of some change in the fundamental harmonic frequency. "This change can occur in any part of the body....Treatment involves the restoration [of the part] to its natural vibratory rate by duplicating the frequency with electronic oscillators and applying this frequency to this [part]" (McClellan, 1988, p. 53).

It is interesting to note that at the end of his work, Jenny, in giving recommendations for future scientific investigation included that, "we will look into the larynx, which potentially contains the whole range of cymatics" (cited in McClellan, 1988, p. 52). Does the possiblility exist that the voice, then, is not only a mechanism of communication and creative expression, but also a complex, built-in tuning fork capable of restoring the body's natural harmony?

The Physics of Vowel Formants

In some Toning techniques the vibration is directed toward a particular place in the body. The vowel sounds can act as focusing agents. Each vowel is the result of a particular vocal tract configuration which has "its own set of characteristic formant frequencies" (Denes &

Pinson, 1963, p. 58). These frequencies do not change with the pitch of the tone which is sung (Pierce, 1983). "In general, the frequency of the formants will not be the same as those of the harmonics [or overtones], although they may coincide" (Ladefoged, 1960, p. 58).

The average resonance-frequencies for the vowels range from approximately 300 Hz to 3000 Hz (Hamel, 1978). The ascending order of the vowels is U - O - A - E - I with the "U" at the 300 Hz level and the "I" at the upper end. Phonetically, these sounds are oo, oh, ah, eh, ee.

The "vocal resonator scale", which has been used in speech training for several decades, also identifies the ascending frequency of the vowel sounds. The "order of pitch resonance" is inherent in the following statement which is whispered: "who would know aught of art must learn and then take his ease" (Greene, 1972 p. 71).

Hamel (1978) found a "connection between the vowels and the natural harmonic series" (p. 123). In listening to and experimenting with the "overtone-voice", he realized that "the gradual transition from the lower to the higher overtones corresponds to the process of vowel-formation leading from U(oo) via O, A and E to I(ee)" (p. 124).

Hamel also found "a further correspondence between

the individual vowels and the parts of the body" based on his experience with "various breathing-schools, above all that of Professor Middendorf in Berlin" where "mutally confirmatory experiments have been carried out to determine which zones of the body can be 'opened' by which vowels" (pp. 124 - 125). Hamel's schematic representation follows:

Head cavity	I
Throat and upper chest (but also the sides)	E
Chest cavity (but also the body as a whole)	A
Abdomen (as far as the navel)	O
Pelvis and lower body	U (p. 125)

Thus, it is possible to increase the vibratory effect in a particular body part by taking advantage of the natural tendencies of the vowel formant frequencies. Recall that the formant is the peak of the spectrum, and that the objective of a resonator (in this case the oropharyngeal cavity) is to reinforce the frequencies which fall in its band-width. As an example, for maximal vibratory effect in the abdomen, the resonator should be "tuned" to "O" and the pitch should correspond to the lower resonant frequencies of the voice.

Measuring vocal vibration

Von Bekesy's (1960) experiments in bone conduction provide further information of how vocal sound affects the body. He found that the skull vibrates like a "rigid body." With low frequencies, the bones of the skull show "simple parallel movements in the same direction" (p. 167). As the frequency increases to the "resonance frequency," the forehead and back of the skull vibrate equally in opposite directions. Above the resonance frequency, the vibratory pattern returned to the forehead. For a male with a 30 cm head circumference, the resonance frequency was 1800 Hz.

To find out about the radiation of sound during vocalization, von Bekesy measured the sound pressure near the mouth and head. He states that the "vibrations from the vocal cords are distributed over the whole body" (p. 183). He measured the dampening effects with curves of equal amplitude, and found that with a low frequency (100 Hz) the vibrations could be measured from the root of the nose to the navel and out to the shoulders.

All the ramifications of von Bekesy's work as it relates to Toning are unclear, especially in regard to the resonance frequency of the skull. What is demonstrated by von Bekesy's experiments is that self-produced vocal sound

does produce measurable vibrations over a major portion of the body.

CHAPTER 5: RESPONSES TO SELF-PRODUCED VOCAL SOUND

Self-produced vocal sound travels the auditory pathway to the brain. The production of the sound, its perception, and the neural stimulation caused by the sound all have a physical, mental, and emotional impact on the human organism. In this chapter, the pathway of audition and the limbic system will be briefly discussed; a connection to the pathway of pain will be explored as a possible explanation for the role of music, and particularly toning, in pain reduction. Vocal sound impacts the listener (Bady, 1985); it is important to consider the impact of hearing one's self-produced sounds, and this will be discussed herein. The phenomena of excitation, relaxation, catharsis, and altered states of consciousness will also be considered. These have been found by the author and others (Campbell, 1989; Keyes, 1973) to be the various conditions which toning can effect or produce.

Physiological Responses

The Auditory Pathway

Sound is physical vibration--mechanical energy. The ear converts this to electro-chemical energy and it is transmitted to the brain which translates the "energy to sensations which we perceive" (Wagner, 1978, p. 90). When referring to self-produced vocal sound, it is important to remember that the sound waves are being transmitted through air and bone. The "transmission to the inner ear is different" (von Bekesy, 1960, p. 127) in bone conduction, but the conversion process is the same once there. There are three components to the ear which are involved in this process--the outer, middle, and inner ear.

The purpose of the outer ear is to "gather sound from the environment and focus these sound waves toward the eardrum" (Wagner, 1978, p. 91). It "also acts as a resonator and amplifies sounds in the range of 2,000 - 5,000 Hz" (Hodges, 1980, p. 43). Hodges also states that the eardrum or tympanic membrane "vibrates in accordance with the frequency and intensity of the waves" (p. 43).

The middle ear houses three ossicles or small bones which "working as a system of levers, amplify the sound waves which are received at the eardrum" (Hodges, 1980, p.

44) and transmit them to the inner ear. Efficiency is increased because the ossicles decrease the motion of the eardrum and increase the pressure of the waves (Wagner, 1978). Despite the "large" vibrations of the throat, "the attachment of the middle ossicles and the distribution of the mass is such as greatly to reduce the sound transmitted from the throat to the middle ear" (von Bekesy, 1960, p. 127).

The basilar membrane and associated structures of the inner ear are where the "acoustic signal, which has existed as a pressure wave in air, bone, or aqueous medium, is first recoded into a new form" (Whitfield, 1967, p. 3). Pierce and David (cited in Hodges, 1980) found that "when the basilar membrane is deformed in vibration, the reticular lamina, tectorial membrane, and organ of Corti slide with respect to each other, bending the hairs" (p. 46). Hodges goes on to say that this "shearing" action activates "the hair cells of the organ of Corti" which "send their electro-chemical signals into the central nervous system" (p. 46).

The auditory nerve, which arises from the hair cells of the basilar membrane (Whitfield, 1967), maintains "the frequency representation of the basilar membrane" (Hodges, 1980, p. 47). Part of the VIII cranial nerve, the

auditory nerve "divides as it enters the brainstem and sends fibers to both the dorsal and ventral cochlear nuclei" (Hodges, p. 47). Hodges also cites Martin, who found in 1975 that as fibers of the auditory nerve leave the cochlear nuclei, some go to the contralateral and ipsilateral superior olivary complex, some to the inferior colliculus, and others to the reticular formation.

Hodges (1980) states that:

> the reticular formation communicates with virtually all areas of the brain, including the cortex and spinal cord. There is a parallel pathway in the reticular formation...which connects with descending tracts in the spinal cord to allow for reflex-type responses to sound stimuli....The final relay station before the auditory path reaches the cortex is the medial geniculate body, located in the thalamus. (p. 47)

Lindsay and Norman are said by Hodges to have found that "various neural units within the auditory cortex respond to different types of sound stimuli. For instance, approximately 40 percent of these neurons can be stimulated only by a complex tone or by a tone of steady frequency" (p. 49). Toning often produces both a complex tone and one of steady frequency.

Bone Conduction

Before continuing with the discussion of the brain, it is necessary to consider some aspects of vocal sound, as it is conducted by bone, since this impacts the experience of Toning. "The hearing of one's own voice by bone conduction is of the same magnitude as it is by air conduction" (von Bekesy, 1960, p. 187). The loudness of bone conducted tones can be increased by occluding the external auditory meatus, the canal leading to the eardrum (von Bekesy, 1960). Von Bekesy also found that "the sound pressures in the mouth cavity produce about the same amount of loudness as the vibrations of the vocal cords" (p.187). A "decrease in loudness is greatest for the vowels produced with a large opening of the mouth (as a in father)" (p. 187). When "the opening of the mouth is small, and accordingly the sharpness of the resonance is great and there is a large pressure difference between the inside of the mouth and the mouth opening" the vibrations of the lower jaw are increased and "therefore the sound oo is heard as rather loud by bone conduction" (p. 187).

The Limbic System

As stated earlier, the auditory pathway includes the thalamus. The thalamus, although part of the diencephalon, is considered part of the limbic system (Carlson, 1981). "Taken as a whole, the limbic system is deeply involved in the emotional aspects of human behavior" (Hodges, 1980, p. 199). The limbic system "consists of a set of interconnecting structures" (Carlson, p.114). According to Roederer (1982), the limbic system

> is a phylogenetically old part of the brain....In conjuction with the hypothalamus...the limbic system polices sensorial input, selectively directs memory storage...and mobilizes motor output with the specific function of ensuring a response that is most beneficial for the self-preservation of the organism in a complex environment. (p. 43)

The amygdala, which is one of the structures of the limbic system, appears to be involved with the facilitation and suppression of emotion (Carlson, 1981).

The specific connections between music, or musical elements such as tone and the various parts of the limbic system have not been identified. Kaser (1984) notes that the physiologic changes, which have been seen in studies

using sedative and stimulative music, are changes which the hypothalamus and limbic system control. Carpenter (cited in Kaser, 1984) "believes that the thalamus, cerebral cortex, and other forebrain structures are involved in the emotional responses initiated by activity in the hypothalamus" (p. 56).

The thalamus, which, as stated earlier in this chapter, is the final relay station before the auditory path reaches the cortex, is also part of the pathway of pain (Carlson, 1981) and a site of "high enkephalin" yield (Stein & Belluzzi, 1978, p. 300). Goldstein (1980) has found that the thrills which have been experienced by people while listening to music are caused by enkephalins.

Enkephalin Production

> Carlson (1981) has traced the pathway for pain: Pain fibers (from the regions below the head) enter dorsal roots of the spinal cord and synapse in the dorsal horn. The second-order neurons located there send axions to the outside of the spinal cord and ascend via the contralateral spinothalamic tract. As this tract ascends, it sends collaterals into the reticular formation [of the mid-brain]. A

> secondary route to the thalamus thus consists of a polysynaptic pathway: the spinoreticulothalamic tract. The thalamus appears to be the "end station" for pain, in that projections to the cortex do not seem necessary for perception. (p. 570)

A comparison with the auditory pathway shows notable similarities. The fibers of both the auditory and pain pathways travel through the reticular formation of the midbrain into the thalamus. Closely aligned with the pain pathway is the production of enkephalins.

Enkephalins are peptide chains of five amino acids, and are endogenous opiates produced by the body. Cells containing pro-enkephalin, one of three opioid precursors, are "extensively distributed throughout the brain and spinal cord, and are found peripherally in the autonomic nervous system, the adrenal glands and the intestine" (Akil, Bronstein & Mansour, 1988, p. 5).

The opioid peptides have been shown to have a "widespread behavioral regulatory role" (Katz, 1988, p. 250). Opioids have been found to be connected with feeding, drinking, sexual behavior, attention and motivation, normal and abnormal cell and tissue growth, and have been associated with various mental illnesses, e.g. schizophrenia and depression (Rodgers & Cooper, 1988).

Beta-endorphin is considered the most potent of the enkephalins (Carlson, 1981). Beta-endorphin cell bodies project to the amygdala and through the medial thalamus. There is also a descending spinal pathway (Akil, Bronstein & Mansour, 1988). Mu receptor sites, located throughout the brain and spinal cord, are "thought to mediate classical morphine like effects such as analgesia and positive reinforcement" (Akil, Bronstein & Mansour, 1988, p. 8). Electrical stimulation of various brain regions has been found to affect behavior and to provide evidence for the existence of specific neural pathways of reward (Bozarth, 1988).

One possible explanation for the effects of pain-reduction and a sense of well-being experienced by those who produce sustained vocal sound (Campbell, 1989; Keyes, 1973) may be that toning releases endorphins. These effects will be discussed in Chapter Six.

Psycho-physiological Responses

Sound as a Contact Phenomenon

With self-produced vocal sound the individual may experience the sound from differing venues. The vibrations from the vocal apparatus are felt as tactile sensations in

the chest and head. The sound waves travel through bone to the inner ear where they are transformed into electrical signals and then sent to the brain cortex. The sound waves also travel through air and enter the ear; here the speaker also becomes the listener.

Moses (1956) discusses "creative hearing" which he describes as "an audiokenetic method of examination" (p. 12). "In 'creative hearing' the reflex muscular reaction of listening must be brought into consciousness" (p. 11). He states the need for the recognition of a "spontaneous and sympathetic kinesthetic sensation" which occurs during listening. Moses says that " primitive perception is close to motor reaction. The primitive ego imitates that which is perceived in an attempt to master intense stimuli" (p. 11). He quotes Bernfeld who said, "Perceiving and changing one's own body according to what is perceived were originally one and the same thing" (pp. 11-12).

Niederland (1958) also discusses the physical effect of the voice upon the listener. He writes "as the intensity of an audible sound is increased, a point is reached at which the listener experiences a nonauditory tactual sound" (p. 491). "This is usually described as 'feeling'....At lower frequencies a gentle but definite vibration is felt which is distinct from and superimposed

on the sound" (p. 492). He cites von Frey (1920) who noted the "vibratory sense" of "'skin deformations' brought about by sound waves incipient upon...sensory cutaneous structures" (p. 492).

Bady (1985) considers the importance of the voices of both patient and therapist in therapy. "The fact is that sound is indeed a contact experience. Sound waves from a person's voice or other sources are transmitted through a medium of air to create tiny, yet definite impressions on the skin and eardrum" (p. 488). She writes of using her own vocal tones to "sooth an anxious, agitated patient" or to "stimulate a depressed and hopeless one" (p. 483). Bady also sees "another aspect of vocalization that has a curative effect--the physical action of creating audible sounds and the physical impact on the indvidual when he hears and feels his own and another's speech" (p. 486).

Greene (1972) believes that the "voice delineates the personality of the speaker as much as or more than the words he speaks. The subtle variations of the timbre, speech, inflection, stress, and volumn all contribute to the impression made by speaker on listener and convey his emotional attitude" (p. 5).

Steiner (1983) said that "when man expresses himself in speech and song, he expresses his whole organization of

body, soul, and spirit as a revelation to the outside as well as to himself, to the inside. Man is completely contained, as it were, in what he reveals in sound and tone" (p. 32). Through the self-produced vocal sound of toning, where one becomes the listener, one may begin to contact the self.

Excitation

Excitation is "the arousing of activity (as by neural or electrical stimulation) in an individual, organ, or tissue" (Webster's third new international dictionary, 1971, p. 792). Arousal is expressed physiologically through the autonomic nervous system which regulates the cardiovasculature, glands and involuntary muscles (Hassett, 1978). An increase in arousal tends to include an increase in mental alertness. The level of arousal can be associated with emotion, e.g., depression is seen to have a low activity or energy level contrasted with happiness which tends to show an increase in energy.

According to Lowen (1975), vocal expression increases "a person's energy level" (p. 49). He also says that the "suppression of feeling diminishes the state of excitation in the body and decreases the ability of the mind to focus"

(p. 65). Lowen goes on to say that "a person's emotional life depends on the motility of his body which in turn is a function of the flow of excitation throughout it" (p. 53). Boxill (1985) said that "singing and musical vocalizations mobilize energy" (p. 101). Toning has been found quite useful, by Keyes (1973) in energizing the self.

Relaxation

"What Benson has termed the relaxation response is believed to be the opposite in nature of the fight or flight response implicated in so many stress-related disorders.... relaxation that evokes these physical changes has the potential for reestablishing a physiological homeostasis consonant with health" (Achterberg, 1985, pp. 136-137). Relaxation is considered by Wolfe (in Kaplan & Sadock, 1985) "to be incompatible with anxiety and therefore, inhibitory to it" (p. 41).

Like arousal, relaxation is mediated by the autonomic nervous system. Kaplan and Sadock say that relaxation techniques "may be effective in combating the symptoms arising from autonomic nervous system discharge by reversing the processes that lead to autonomic arousal" (p. 320). Relaxation has been used in the treatment of

hypertension, headaches, and drug and alcohol abuse (Kaplan & Sadock, 1985).

"Melodically speaking, relaxation is associcated with the decline in tension which is effected when pitches are lower" (Meyer, 1956, p. 139). Boxill (1985) states that by humming a melody an "agitated, hyperactive" person "can create his or her own sense of calm through the vibratory effect of the music as well as the emotional gratification it affords" (p. 101).

Catharsis

From Webster's Third New International Dictionary (1971), catharsis is defined as the "purification or purgation of the emotions....that brings about...a satisfying release from tension" (p. 353). The same source also sees catharsis as "the process of bringing repressed ideas and feelings into the consciousness". Kaplan and Sadock (1985) define emotion as "a complex feeling state with psychic, somatic, and behavioral components that is related to affect and mood" (p. 176). According to Rank (in Kaplan & Sadock) "emotions rise as a result of the blocking of impulse from without or within" (p. 107).

Mosonyi (cited in Sterba, 1965) said that "tone and

noise are more primitive and direct expressions than words, they provide a more direct discharge of tension" (p. 101). Lowen (1975) emphasizes "letting the sounds out" (p. 274). He speaks of the necessity to release pain through a scream, cry or yell. Yet, "if the pain or terror is not brought to the surface and worked out, the cathartic effect of releasing the screams, rage and sadness is short-lived" (p. 121).

Singing has been seen to allow for the release of repressed emotions (Lundin, 1967). Keyes (1973) believes that toning releases both physical and emotional tension.

Altered States of Consciousness

Charles Tart (1969), defines an altered state of consciousness (ASC) as a "qualitative shift in [an individual's] pattern of mental functioning, that is, he feels not just a quantitative shift (more or less alert, more or less visual imagery, sharper or duller, etc.), but also that some quality or qualities of his mental processes are different" (pp. 1-2). In 1958, Hebbs (as cited by Ludwig, 1969) stated that we need "varied and diversified environmental stimulation" in order to maintain "normal cognitive, perceptual, and emotional experience" (p. 12).

There is evidence that "gross interference" with these processes (cognitive, perceptual and emotional) produces ASC's. Ludwig presents several characteristics of ASC's, among these are "change in meaning or significance", a "sense of the ineffable", and "feelings of rejuvenation" (pp. 15-17).

One way to produce an ASC is through "increased alertness or mental involvement" (Ludwig, 1969, p. 14). "Selective hyperalertness", or attention to a singular focus, results in "peripheral hypoalertness over a sustained period of time" (p. 14). Ludwig reports that Mayolin and Kubrie showed in 1944 that ASC production resulted from "attending to one's amplified breath sounds" (p. 14). In shamanic practices, chanting and drumming are used to produce ASC's (Achterberg, 1985).

One of the characteristic features of toning is a prolonged focus or attention to a sustained vocal tone. Another explanation for the heightened sense of well-being reported by Campbell (1989) and Keyes (1973) may be that toning produces ASC's.

CHAPTER 6: TECHNIQUES AND USES OF TONING

Much of this chapter is based on the author's personal experience with toning over a period of eight years. Many of the techniques are those used by the author. When possible, the work of others will be offered as comparison.

The impetus to use toning comes from the need or desire to make some kind of adjustment to the present state of being in order to reach a state of balance, homeostasis. The attention is placed on the physical self and adjustments are made through the vocal mechanism.

In the therapeutic milieu, toning provides the client with information about the physical self. Through attention to breath and the sounding of the breath, the person becomes aware of areas of tension and holding. Sustaining a sound allows tension to be released. Chronic patterns of tension and holding may be identified, and so, provide the impetus for change. Sokolov (cited in Bruscia, 1987) says "the therapist is seen as a guide, a teacher, an ally, a witness, a support, an instigator, and

a model" (p. 358).

The following toning techniques and their possible results will be considered: raising and lowering pitch to alter energy levels, sustained resonance for pain reduction, toning in massage and body work, in emotional catharsis and abreaction therapy, to increase vocal range and creative expression.

Raising Pitch to Increase Energy Level

Begin with deep sighs to release tension; allow the voice to sound a comfortably low pitch on the vowel sound "U". Sustain the tone through several exhalations, and then, very gradually, allow the pitch to rise. As the pitch moves upwards and the resonance is felt in different locations, e.g. shifts from abdomen to chest, change to the corresponding vowel sound, U - O - A - E - I as found in Chapter Four. It is important to allow the tone to rise slowly, at its own rate.

Campbell (1989) believes that "to sound the voice is to massage, oxygenate, and vibrate ourselves internally, from the inside out. Singing and speaking move the vibratory epicenters so quickly that there is no time for the body to balance itself with the sound" (p. 91).

Keyes (1973) believes Toning stimulates circulation and nerve energy in the body.

Lowering Pitch to Increase Relaxation

Allow a sound to be emitted spontaneously; begin with this pitch, vocalize an "I" (ee). Sustain the tone, and then allow it to fall of its own accord. Once again, it is important that the process occur slowly, at its own pace. The role of the mind is to observe, not dictate (Keyes, 1973).

A 32-year-old woman, who was unable to fall asleep at night due to high mental activity, reported that she was able to fall asleep within 20 minutes after toning in this manner. The vowel sounds may serve not only to focus the pitch, but also limit the thought content and thereby decrease mental activity. The same woman states that she continues to use this technique at any point in the day when she feels "upset or anxious."

Sustained Resonance for Pain Reduction

The author has found toning useful in alleviating headaches, back pain, the general body aches from flu, and

the distress due to Parkinson's Disease. The approach can be either to localize the pain and direct the sound into the area, or to generate a full body resonance where the effect is felt systemically.

In the case of a headache, for example, the tone is focused directly into the area of pain. "There is a tone which resonates with the pain and relieves the tension" (Keyes, 1973, p. 34). The "I" (ee) sound will resonate best in the head (see Chapter Four). This author recommends slight experimentation with the level of the pitch, i.e. raising and lowering it, will allow one to find the point of greatest vibration, or resonance, in the area of the pain. Sustain the tone through exhalations. Usually, the pain is lessened during the sound, and then returns on inhalation. However, as the pain returns it is diminished.

A 27-year-old woman with a severe sinus headache reported that, although the pain had not subsided entirely, she was "feeling much better" and that the pain had become tolerable. A 36-year-old woman stated that her "slight headache" had "completely gone."

This author has found that when the pain is not easily localized, full body resonance can be effective in reducing pain. In this case, the "A" or "U" vowel is

sounded at that pitch which causes a generalized vibration. Some experimenting with raising and lowering the pitch will determine which pitch level causes maximal resonance. Sitting in an overstuffed chair or lying in bed seems to increase the effect. As with focused tone, the pain is markedly reduced during the exhalations and returns, somewhat diminished, upon each inhalation. Over time, the pain is reduced either totally or to a tolerable level.

One of the problems with toning in pain reduction is that there is a physical effort required to make the sound which may be beyond the person's capability. A 67-year old man with Parkinson's Disease initially found some relief in toning. His wife reported the following year that she could no longer "get him to tone" because he was "too tired."

Toning in Massage and Bodywork

Toning can be used during various types of bodywork, e.g., massage, shiatsu. Beaulieu (1987) recommends that, while painful spots are pressed, the client "imagine a sound that resonates with the pain" (p. 120) in order to reduce the pain. There may be a further advantage. A 49-

year-old woman with severe rotary scoliosis reports that she uses toning during therapeutic massage work. She states that she uses a sustained tone on exhalation which gives her a different focus of attention and allows the massage therapist to continue working on painful areas.

This same woman also reports that on one occasion the tones had moved to a height well above her normal range; they were tones of "keening or mourning" from which she experienced tears of release and insight which she described as "coming to terms with self". In comparing this with Lowen's findings (see p. 30), this author believes that the keening sounds may have been related to the hysterical expressions which may accompany mourning.

Toning for Catharsis and Abreaction in Therapy

A sigh, a groan, a cry, a laugh--these are all ways in which tension is relieved. They are natural sounds which most people emit spontaneously. Lowen (1975) says that "because the voice is so closely tied to feeling, freeing it involves the mobilization of supressed feelings and their expression in sound" (p. 273). His bioenergetics emphasizes "letting the sounds out" (p. 274) and screaming, crying, and yelling are part of the

process. Screaming, in particular, can be most damaging to the voice. Toning can provide a less harsh approach if the person who tones is encouraged to sustain the tonal aspects of the expression.

Begin with deep sighs and groans. If possible, sustain the sound or tone for the full length of the exhalation. Allow and encourage any sound that emerges spontaneously, including words or phrases. The body should also be free to move with the sound. In this technique, it is important to merely observe the sound and its direction; this is "freeing the body-voice" (see Chapter One).

Sounding on one or more vowel sounds is useful. Sokolov (in Bruscia, 1987) says that "vowels open up the body and make the emotions fluid. They are therefore most useful when the client is emotionally blocked or when energy is obstructed" (p. 358). In this case, which ever vowel sound is emitted spontaneously is the correct one. The process time varies greatly according to the level of tension and experience with the technique, and continues until a clear, steady tone arises accompanied by a sense of release and well-being (Keyes, 1973).

Keyes stresses the importance of visualization during the process. She writes: "It is not enough to let the

negative feelings be released and expressed. Feelings of purpose must replace them--the person must be inspired to feel that he is noble, good, and worthy" (p. 26). Imagery showing the dissolution of the pain and tension followed by positive affirmations of self are recommended.

This technique can be used to relieve the stress and strain of daily living. In a therapeutic setting, it may assist in releasing deeper psychic pain and locating the origin of the pain. "If the pain or terror is not brought to the surface and worked out, the cathartic effect of releasing the screams, rage, and sadness is short-lived" (Lowen, p. 121). Lowen believes that expression of known trauma is also important in the growth process. "Knowledge becomes understanding when it is coupled with feeling. Only a deep understanding, charged with strong feeling, is capable of modifying structural patterns of behavior" (p. 62).

The therapist who chooses to use this tool must be prepared for the effect. "Abreaction brings about an awareness, often for the first time, of degrees of emotion previously blocked from consciousness. It is often a highly therapeutic experience, even though it may produce an unavoidable sense of distress in all concerned as the process unfolds" (Kaplan & Sadock, 1985, p. 615).

Dawes (personal communication, 1989) states that she uses toning with sexually abused women. The following case study shows how toning was used to bring up feelings which were able to be verbally processed.

A Brief Case Study

A generally quiet, agreeable, 26-year-old white male with moderate to mild mental retardation was exhibiting angry outbursts which could not be related to a specific cause. He would, at times, snarl and growl; he would also say, "I must not cry." He was assured that it was alright to cry, and encouraged to make whatever sounds he wished; sounds were made along with him, for support. As the sounds became longer and deeper, the client became enraged. A safe environment was provided by removing physical obstacles, providing large pillows, calmly talking with the young man, and suggesting movements which would help dissipate the anger. Later, the client confided that his male roommate was making sexual advances toward him. The roommate was removed from the household.

During a subsequent session, the client began wretching and making violent full-body jerking movements. The client insisted that someone else was moving his body; he became terrified. He responded to words of support and eventually calmed down. The following night, while in

bed, he began to cry and the movements began again. They were observed to be sexual in nature, and the client was heard to protest. This time he became much more dissociative and required a sedative.

As the repressed material emerged, in the following weeks, it began to filter his consciousness and verbal therapy was provided to help him deal with his anger and guilt. The toning was continued to allow further release. He was now able to make sounds and movements to "chase away the bad feelings" and then make sounds of a "good, strong man".

Toning in Increasing Vocal Range

Working with the toning process promotes greater attention to the sound and range of the voice. Hamel speaks of finding one's "own note" (p. 186). This is established by finding the deepest note of one's own vocal range.

Allow the voice to descend as far as is comfortable, sound through all the vowels on a single tone and then move to a higher or lower pitch. Reynolds (personal communication, 1989) states that she finds this useful in increasing the vocal ranges of her mentally retarded clients.

Kenny (1982) suggests that when an individual taps into personal creativity the door is opened for such things as responsibility for self, freedom, action and self-expression, self-determination, and choices. These all feed into and are fed by creativity. She states:

> Creativity exists in every individual and awaits only the proper conditions to be released and expressed. There are, in general, three conditions necessary for creativity to emerge:
>
> 1) lack of rigidity;
> 2) an expressive situation and availability of tools for expression;
> 3) spontaneous playing with patterns, shapes, sounds, colors, ideas, relationships. (p. 15)

Toning promotes the setting of these conditions. Initially, the intent is to free the voice and use it to break through pain and tension. As the voice emerges, unfettered by physical and emotional dross, the person has a most expressive tool with which to explore the world of melody, timbre, and rhythm--to explore one's own music.

CHAPTER 7: DISCUSSION

This work began with the belief that toning may have something of value to offer the field of music therapy. Unknown at the outset was how to clearly define toning and what underlying principles supported the broad hypothesis that toning is a therapeutic tool. An investigation of the liturature proved sparse, and what was available was less than scientific.

Early vocal development and cultural uses of vocal sound were investigated. The literature shows that infants tend to freely use as much of the voice as is available to them. The culture generally defines how the voice is used.

The vocal apparatus was studied to increase understanding of how vocal sounds are emitted. It has become more clear to this writer that toning/vocal sounding should be done with care. The voice is a powerful, yet delicate instrument which requires some caution in how it is used. Sounding which causes vocal pain should be discontinued. Often a change in posture

and/or a decrease in intensity will effect the same kind of release.

The investigation of the acoustical properties of vocal sound indicates there is a measurable vibratory effect which may affect the human cellular structure. This is an area for future study.

Questions generated by looking at how self-produced vocal sound impacts the limbic system take two forms. In what way does toning facilitate emotional responses--through production of the tones or through hearing the sounds which are produced. This author believes that these mechanisms are intertwined. The vocal apparatus itself provides a gratifying release of air pressure. The sound is filtered, and certain frequencies are amplified which may generate a pleasurable sense of resonance. The person also hears the sounds which are produced. The auditory information travels through the limbic system to the auditory cortex, is processed and responded to physiologically once again via the limbic system.

The other questions connected with the limbic system concern the production of enkephalins. The location and type of opioid receptors within the limbic system, as well as throughout the autonomic nervous system, may explain the experiences of pain reduction

and altered states of consciousness from sustained tone. Is electrical stimulation, which in rats produces an endorphin response, similar to the vibratory effect of sustained tone?

Other research questions which relate to physiology are: How does toning correlate with established relaxation techniques, especially breathing exercises? How does toning affect the physiologic parameters of EEG, GSR, heart rate and respiration?

Psychodynamically, there is some information which the soundings of the voice offer. For a full understanding of psychoacoustical voicings, more than the sounds of toning are required. Speech and song offer additional information to complete a vocal portrait. However, toning may provide important information since it is essentially spontaneous and the others may be more controlled. This area of vocal diagnosis is open to expansion.

In conclusion, there is some evidence that toning may be a viable tool for the music therapist. The focus of attention is the physical body; the effects may be seen on the physical, mental, and emotional levels.

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